Space Weather Forecast

Issued on Monday, 16 September 2024 at 13:13 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

Space Weather Forecast Headline: Chance of Moderate flares. G1-G2/Minor-Moderate Geomagnetic storms expected 16-17 Sep, with a chance of G3/Strong storm intervals and slight chance of peak G4/Severe storm conditions due to a forecast fast coronal mass ejection arrival.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Low with only Common-class flares observed. There are eight sunspot regions on the disc with the most active being the moderately sized group in the southeast. It remains a compact region, but appears to have lost its complex spot in the trailing portion of the group. Growth has been limited and generally confined to the leading region. A moderately sized group in the southwest exhibited slight growth, including development of a small, complex spot in the largest trailing part of the group. Elsewhere, minor growth of a small region in the northwest was observed, as well as the emergence of a small, simple sunspot to the east of this. Two regions rotated over the southeast limb. Both appear to be mature, simple regions, but may reveal more complexity as they come into clearer view. The remaining sunspot groups observed slight decay or were stable.

No new Earth-directed coronal mass ejections have been observed.

Solar Wind / Geomagnetic Activity: Solar wind parameters were somewhat enhanced during the period, with wind speeds erratic and varying between 400-580km/s (slightly elevated to elevated). The Interplanetary Magnetic Field (IMF) was largely steady, and Weak to Moderate in strength, but became more persistently Moderate from 16/0500 UTC, perhaps attributed to a weak connection to a fast wind from a coronal hole in the southwest disc. The important north-south component was erratic, but often negative. The net result of these parameters was for Quiet to Active geomagnetic activity (Kp 2-4).

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is above normal background levels following the strong solar flare on 14 Sep, but remains below the S1/Minor Storm threshold.

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Four-Day Space Weather Forecast Summary

Solar Activity: Low to Moderate activity is forecast, with a chance of Moderate flares, most likely from the previously active region in the southeast, or developing region in the southwest. There is a slight chance of an isolated Strong flare from the largest region in the southeast.

Solar Wind / Geomagnetic Activity: There are up to two CME arrivals and up to two coronal hole fast winds which feature in the forecast. The most significant feature is the 14 Sep coronal mass ejection which may bring Strong or Very Strong solar winds at Earth on day 1 (16 Sep). This feature is likely to have lingering effects into day 2 and 3 (17 and 18 Sep) combined with the first coronal hole fast wind. A second coronal hole fast wind may arrive day 3 or 4 (18 or 19 Sep), with slightly elevated to elevated speeds possible.

Until the arrival of the CME on day 1 (16 Sep), geomagnetic activity is forecast to be between Unsettled and G1/Minor Storm levels. Following the CME arrival persistent G1-G2/Minor-Moderate storming is expected, but with a high chance of peak G3/Strong storm levels and a slight chance of G4/Severe storm intervals occurring. These risks gradually decrease between days 2 and 4 (17 and 19 Sep) due to waning CME and coronal hole fast wind effects.

Aurora: Auroral activity is expected to peak Monday night into Tuesday morning (16-17 Sep) UTC, following the anticipated arrival of a CME that left the Sun on 14 Sep (Saturday). This is forecast to bring aurora visible to the naked eye across Scotland, Northern Ireland, Northern England and perhaps also to Wales and other parts of England where skies remain clear. Lingering effects may then continue Tuesday night into Wednesday morning (UTC), once again with aurora sightings likely across Scotland and perhaps Northern Ireland and parts of Northern England, though generally declining with time.

Energetic Particles / Solar Radiation: The count rate of energetic particles (high energy protons) is above normal background levels following the Strong solar flare on 14 Sep, but remains below the S1/Minor Storm threshold. There is still a chance that S1 proton storm levels may be reached day 1 (16 Sep), this risk reducing later in the period.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	90	80	30	10
Strong	G3	No	45	25	5	1
Severe	G4	No	15	5	1	1
Extreme	G5	No	5	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	No	45	45	40	40
Very Active	R3 to R5 X	No	10	10	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	30	20	10	10
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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